Micro-Rapid Prototyping

Completed Technology Project (2013 - 2016)

Project Introduction

Micro-rapid Prototyping from 3-D CAD to Final 3-D Shape seeks to replicate some of the capabilities of the much more expensive direct write e-beam in the fabrication of microdevices. This technique has the promise to be orders of magnitude cheaper and faster than traditional techniques based on gray scale e-beam lithography.

The goal of this task is to create a maskless process for sample 500 µm 3-D objects. Specific objectives are to

(1) Develop 3-D CAD computer models and suitable resist processes while working on dry etch techniques to hit the 500 µm goal

(2) Demonstrate optical gray-scale pattern formation and

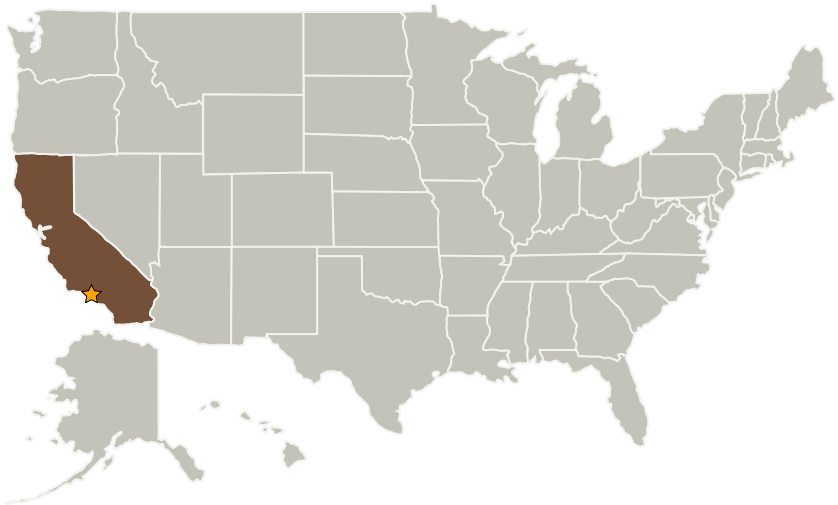
(3) Test concepts on commercial state of the art maskless machines capable of gray scale lithography.

Anticipated Benefits

This technology could be beneficial for detectors for Earth Science or Astrophysics missions, or miniaturized devices on SmallSat missions. Sample applications could include microlens arrays for IR detectors, fuel emitters for micropropulsion, or injectors for THz sensing.

This technology could be beneficial for commercial communication or resource monitoring missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

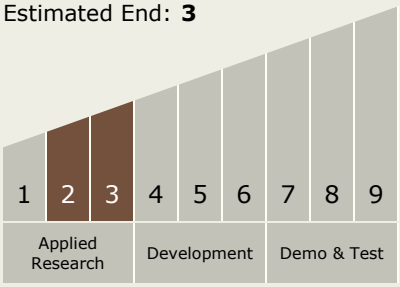
Jonas Zmuidzinas

Principal Investigator:

Victor E White

Technology Maturity (TRL)

Start: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.4 Other Advanced Propulsion Approaches